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# CANADIAN PATENT

## SPRING ACTUATED DIVING BOARD

Charles Borg, Toronto, Ontario, Canada

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This invention relates to improvements in swimming pool apparatus and more particularly to improvements in spring actuated diving boards.

It is conventional practice to utilize a hard, springy wood in the construction of diving boards, one end of which is securely anchored and the opposite end extending over a swimming pool, the natural resilience of the wood being utilized to throw a diver to a height prior to commencing his dive, having the disadvantage that continuous flexing causes the board to break, usually at, or near, its base, and, furthermore, the weight of a diver utilizing such a board determines the amount of downward flexure of the board, and, thereby, the height to which the diver is thrown. This results in lighter weight divers being thrown to a lesser height and, consequently, having less time to execute any acrobatic functions they may wish to do in mid-air, than the heavier divers.

Other attempts to solve the foregoing difficulties have resulted in spring-loaded diving boards which, however, still give the heavier diver a height advantage over the lighter one. Others which are adjustable to the weight of the diver thereon having extremely complicated mechanism.

It is an object of this invention to provide a spring-actuated diving board, in the following called a diving board, that will utilize the energy from a coil spring to provide the required upward thrust necessary in executing a dive of this type.

It is another object of this invention to provide a diving board, the upward thrust of which may be controlled to individual requirements.

It is a further object of this invention to provide a diving board that is actuated by the diver upon jumping on the end of the board.

It is still another object of this invention to provide a diving board that will automatically reset its spring-loading immediately after a diver has been thrown therefrom.

It is another object of this invention to provide a diving board that will fling a diver outwardly arcuately over a pool.

These and other objects and features of this invention will become apparent when taken in conjunction with the accompanying drawings in which:-

Fig.1 is a fractional, sectional, side elevation of a diving board embodying this invention, illustrating the mechanism in its extended state after having thrown a diver therefrom.

Fig.2 is a fractional, sectional, side elevation of a spring mechanism embodied in this invention, illustrating the method whereby the spring is releasably retained in its compressed state prior to its release by a diver.

Referring to Fig.1, a diving board 10 is shown having a free end 11 projecting outwardly over a swimming pool and an anchored end 12 rigidly attached to a vertical shaft 13. In this manner, board 10 is entirely cantilevered from shaft 13.

Shaft 13 is supported at its lower end with an integral plate 14 supported by a helically coiled spring 15. The upper end of shaft 13 is slidingly supported by the upper end wall 16 of a main cylindrical casing 17, spring 15 being contained therein and shaft 13 passing upwardly therethrough.

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Spring 15 and plate 14 operate within an enclosed cylinder 18. An aperature 19 in the upper wall of cylinder 18 permits shaft 13 to pass freely therethrough.

Two oppositely located slots 20 and 21 are formed vertically in the upper portion of cylinder 18 allowing two tabs 22 and 23 respectively which are integral with plate 14, to extend radially outwardly therethrough. Plate 14, therefore, is restricted from rotation in the horizontal place by the action of tabe 22 and 23 in their respective slots 20 and 21. Thus shaft 13, being integral with plate 14, is also prevented from rotation about its longitudinal axis and diving board 10 thereby retained in substantially the same vertical plane.

Upon spring 15 reaching its fully expanded position, tab 22 is adapted to contact a micro-switch 24, which, in turn, actuates an electrically driven rack and pinion gearing, comprising a rack portion 25 formed vertically on shaft 13 and an electrically driven pinion gear 26 incorporating ratchet means, adapted to drive shaft 13 through rack 25 downwardly thus compressing spring 15, and, upon release of spring 15 to allow shaft 13 to move freely upwardly.

At the bottom end of its travel, tab 22 is adapted to trip an electro-mechanical lock 27, the action of which is more fully illustrated in Fig. 2, in which shaft 13, through rack 25, has been driven downwardly by pinion 26 and tab 22, having moved past lock 27, is downwardly retained thereby, automatic means being incorporated in lock mechanism 27 to switch off the electricl actuating means for pinion 26.

With further reference to Fig. 2, it will be seen, therefore, that spring 15 is mechanically held in a fully compressed state through plate 14, tab 22, and electro-mechanical lock 27.

Referring to Fig. 1, a waterproof, micro-switch 28 is located in the upper surface of diving board 10 adjacent free end 11 and, upon being depressed by a diver jumping thereon, is adapted to actuate electro-mechanical lock 27, freeing tab 22 and thereby allowing spring 15 to expand. This action is instantaneous, and, therefore, a diver contacting switch 28 will immediately be given added upward impetus by the action of spring 15 through plate 14 and shaft 13 causing diving board 10 to move rapidly upwardly.

Referring to Fig. 1, the uncontrolled release of spring 15 would result in a snap action at board 10, and a heavy impact would be felt by the diver which may strain his leg and back muscles and also make it difficult for him to control his diving procedure. A damping mechanism 29 is therefore incorporated to permit board 10 to rapidly but smoothly accelerate upwardly under the influence of spring 15, thereby imparting to the diver a similar smooth upward acceleration and allowing him to control his movements with greater efficiency.

Damping mechanism 29 comprises a piston 30 operating in an enclosed cylinder 31, piston 30 being integral with shaft 13, a variable check valve 32, a reservoir 33 and a non-return valve 34. A substantially horizontal arm 35 is attached at its outer end through a wing nut and bolt assembly 36 in releasable, adjustable engagement with a vertical rod 37, wing nut and bolt assembly 36 being retained within a vertical slot located in the upper end of rod 37. The lower

end of rod 37 is pivotaly attached to tab 23 extending from plate 14.

Upon release of spring 15 and upward travel of plate 14, rod 37 is adapted to move substantially vertically upwardly causing horizontal arm 35 to move arcuately upwardly and to progressively open a metering orifice of check valve 32.

In operation, and prior to a dive, the mechanism is positioned as illustrated in Fig. 2, spring 15 being compressed by plate 14 and retained in that position by electro-mechanical lock 27 engaging with tab 22. Rod 37, being attached to tab 23 of plate 14, is also at its lowest position and arm 35 is at its lowest arcuate position causing the metering orifice in check valve 32 to be substantially closed. Shaft 13 is fully retracted within casing 17 and diving board 10 is at its lowest position. Piston 30 is substantially at the bottom of cylinder 31 and the annular space formed between shaft 13 and the walls of cylinder 31 is filled with hydraulic fluid. Reservoir 33 is air filled, having a suitable, protected vent 38, adapted to permit the escape of air only, upon reservoir 33 becoming filled with hydraulic fluid. Non return valve 34 permits flow of fluid from reservoir 33 into cylinder 31 only.

Upon a diver operating micro-switch 28 in board 10, thereby releasing spring 15 through electro-mechanical lock 27, shaft 13, and, therefore, board 10, is urged upwardly. This upward travel is controlled by the amount of fluid allowed to escape from cylinder 31 into reservoir 33 through check-valve 32. The flow of fluid through check-valve 32 is metered through a variable orifice and therefore

upward travel of piston 30 is highly restricted at the beginning of the stroke, the restriction becoming less as arm 35 is moved arcuately upwardly under the influence of rod 37, and therefore the amount of fluid able to move through check-valve 32 is progressively increased, permitting piston 30 to move upwardly at a faster rate.

It may be seen therefore, that shaft 13 and, therefore, board 10, accelerates from a low to a high speed upon spring 15 being released, the rate of acceleration being determined by the variable orifice in check-valve 32.

As previously explained, check-valve 32 is controlled through arm 35 whose position in relation to plate 14 is determined by the effective length of rod 37. Upon wing nut 36 being slackened and arm 35 moved arcuately upwardly, a greater flow of fluid through check-valve 32 is permitted at the commencement of the upward travel of shaft 13, and therefore a higher acceleration range is obtained. Conversely, a downward adjustment of arm 35 in relation to rod 37 results in a lower acceleration range. An access plate 39 located in the side of casing 17 adjacent check-valve 32 enables a diver to set the desired acceleration of board 10 by an adjustment utilizing wing nut 36.

At the upper end of travel of piston 30, as illustrated in Fig. 1, all the hydraulic fluid is retained within reservoir 33, air having escaped therefrom through vent 38, the diver has been propelled from end 11 of board 10 to complete his dive, and tab 22, as previously explained, has actuated switch 24.

The actuating of switch 24 causes motorized pinion 26 to

drive rack 25 downwardly and, rack 25 being integral with shaft 13, board 10 is lowered and spring 15 compressed, being retained in that position by electro-mechanical lock 27 acting upon tab 22. Upon moving downwardly piston 30 causes the hydraulic fluid in damping mechanism 29 to be drawn downwardly from reservoir 33 through non-return valve 34 into cylinder 31, air re-entering reservoir 33 through vent 38. Check-valve 32 is also re-set to its minimum metering position through the action of arm 35 and rod 37 being moved downwardly through tab 23 attached to plate 14.

Thus it may be seen that, immediately a diver leaves board 10, it becomes automatically re-set as illustrated in Fig. 2 in preparation for the next operation.

It should be noted that casing 17 is firmly anchored to a concrete or the like base 40, the whole assembly being slightly tilted towards the swimming pool so that the diver will be projected angularly outwardly away from board 10, thus ensuring he will arc outwardly above the water and not return to board 10.

The general design of the individual parts of the invention as explained above may be varied according to requirements in regards to manufacture and production thereof, while still remaining within the spirit and principle of the invention, without prejudicing the novelty thereof.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:-

1. A spring actuated diving board comprising a base member, spring means supported by said base member, a connecting rod resiliently secured at its lower end to said spring means, a spring board rigidly secured to the upper end of said connecting rod, damping means adapted to limit the upward travel of said connecting rod, and motor driven means adapted to move said connecting rod downwardly against said spring means.

2. A spring actuated diving board comprising a base member, spring means supported by said base member, a connecting rod resiliently secured at its lower end to said spring means, a spring board rigidly secured to the upper end of said connecting rod, damping means adapted to limit the upward travel of said connecting rod, and motor driven means adapted to move said connecting rod downwardly against said spring means, said damping means comprising an upper cylinder and a lower cylinder, a first pipe means and a second pipe means providing communication between said upper cylinder and said lower cylinder, a one way valve providing fluid control from said upper cylinder to said lower cylinder, a throttle valve providing control from said lower cylinder to said upper cylinder, and fluid means within said upper cylinder and said lower cylinder.

3. A spring actuated diving board as claimed in claim 2 wherein said spring means comprises a coil spring, an outer case, a piston located above said spring within said case and being a sliding fit therein, a slot in said outer case, an exterior projecting lug secured to said

piston, adapted to project through said slot and restraining means adapted to releasably secure said piston against said spring.

4. A spring actuated diving board as claimed in claim 2 comprising an adjustable link interconnecting said throttle valve with said piston.

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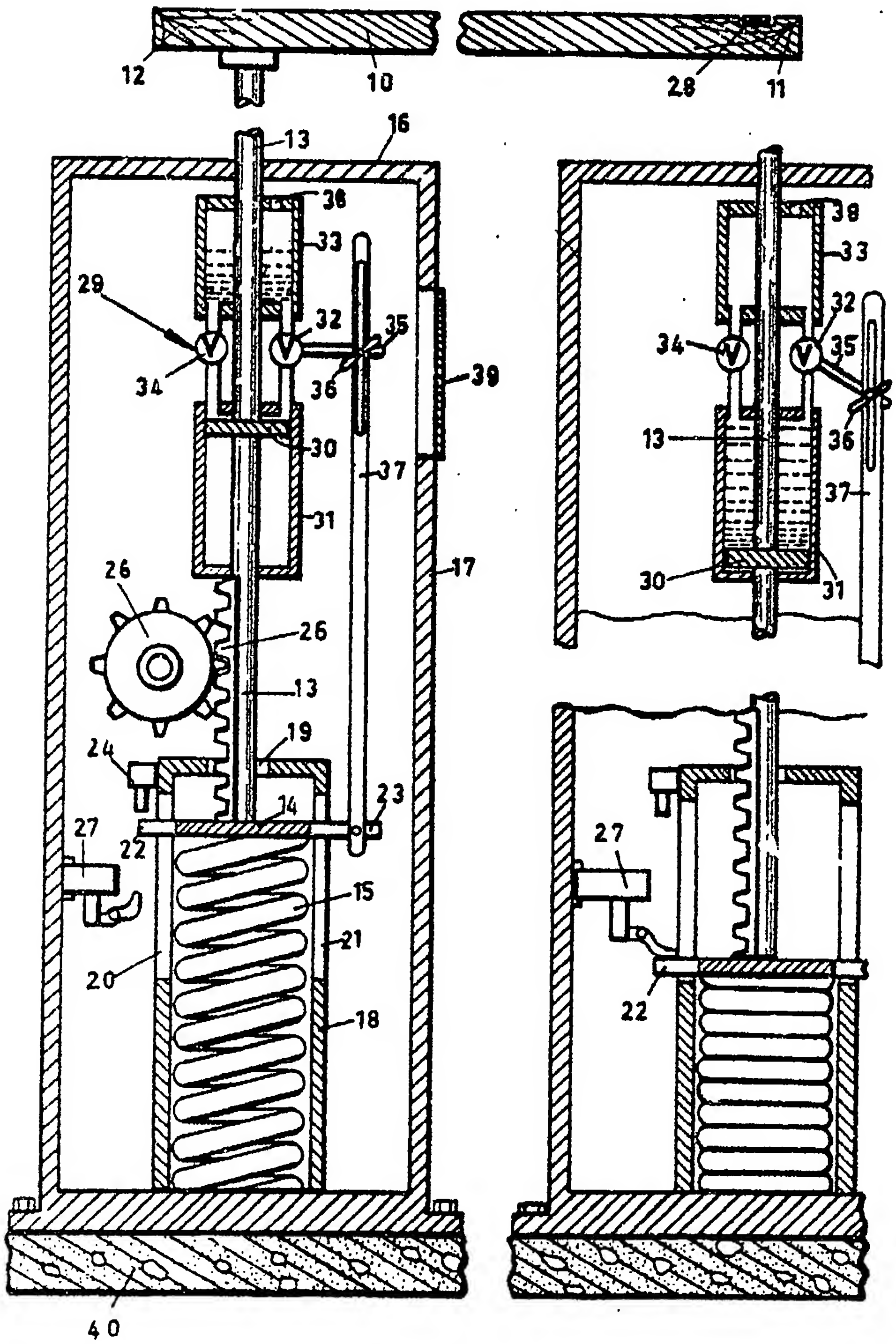


Fig. 1

Fig. 2